

Figure S1. Map of (a) locations and plots of (b) daily mean temperature and (c) precipitation summed up for each week from sowing to harvest for each location. Colours of locations in (a) indicate the locations in plots (b) and (c). Crosses in (a) show locations that could not be harvested.

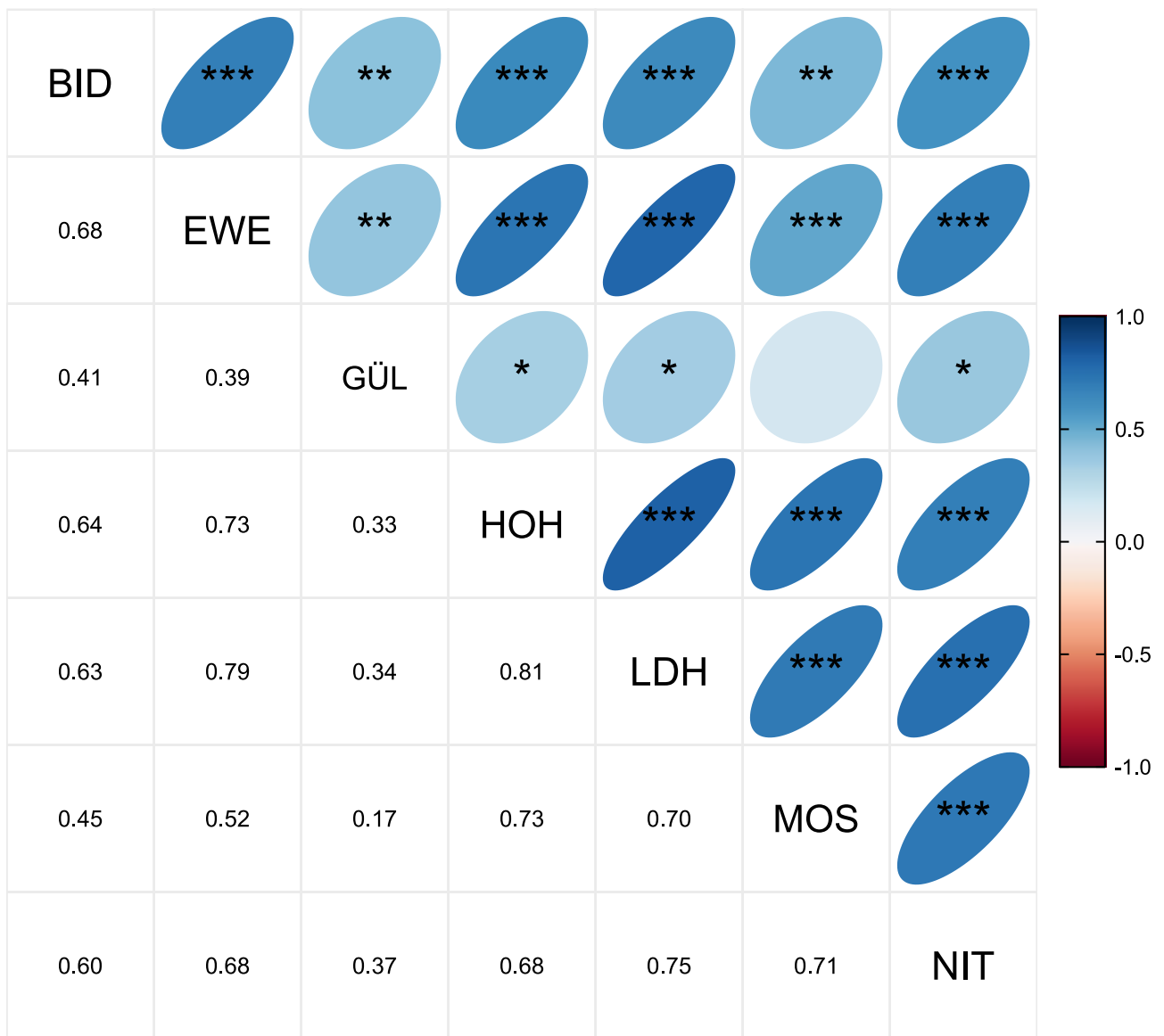


Figure S2. Correlation matrix for seed yield between seven locations.
 *P < 0.05, **P < 0.01, ***P < 0.001

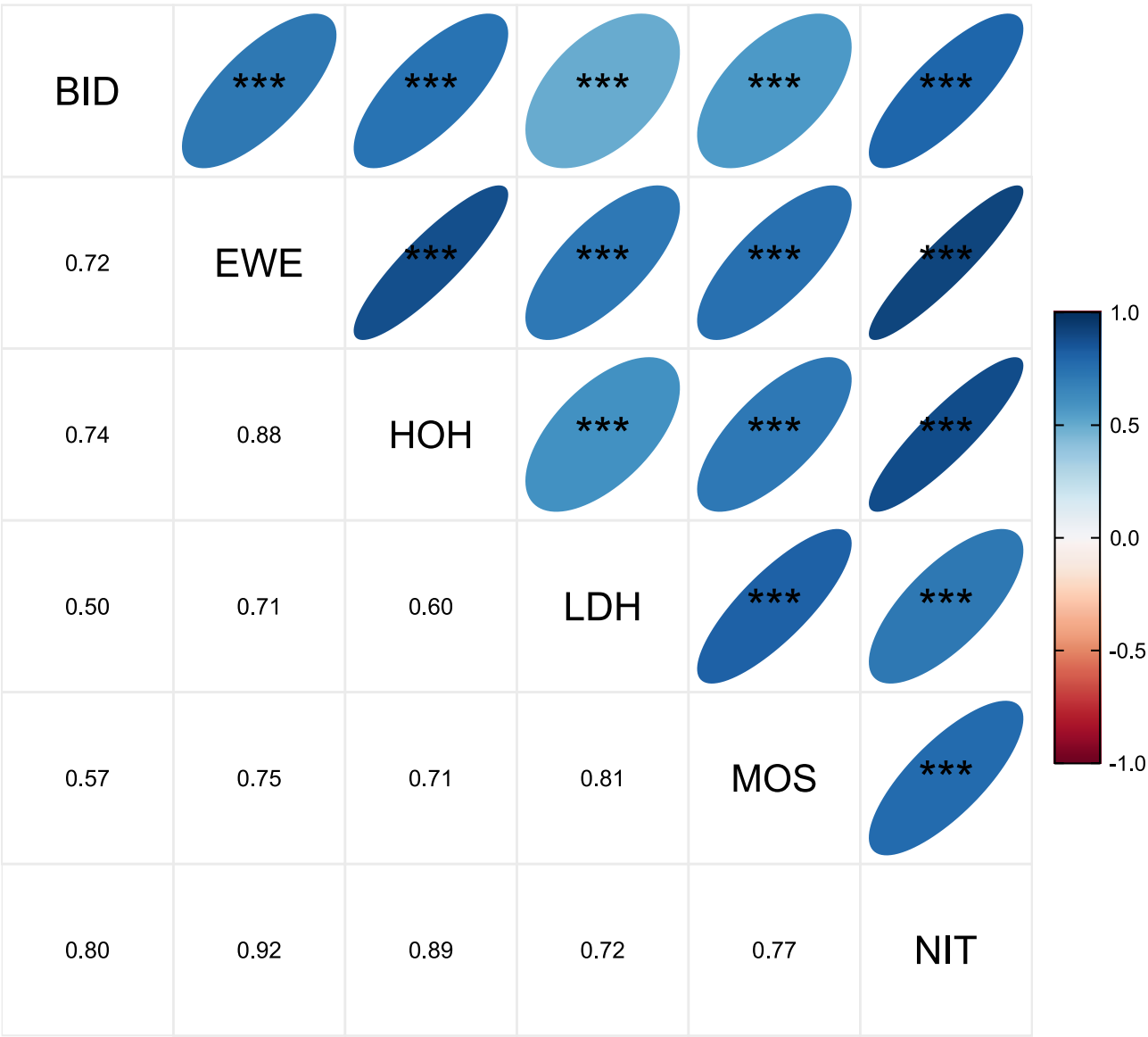


Figure S3. Correlation matrix for protein content between six locations.
***P < 0.001

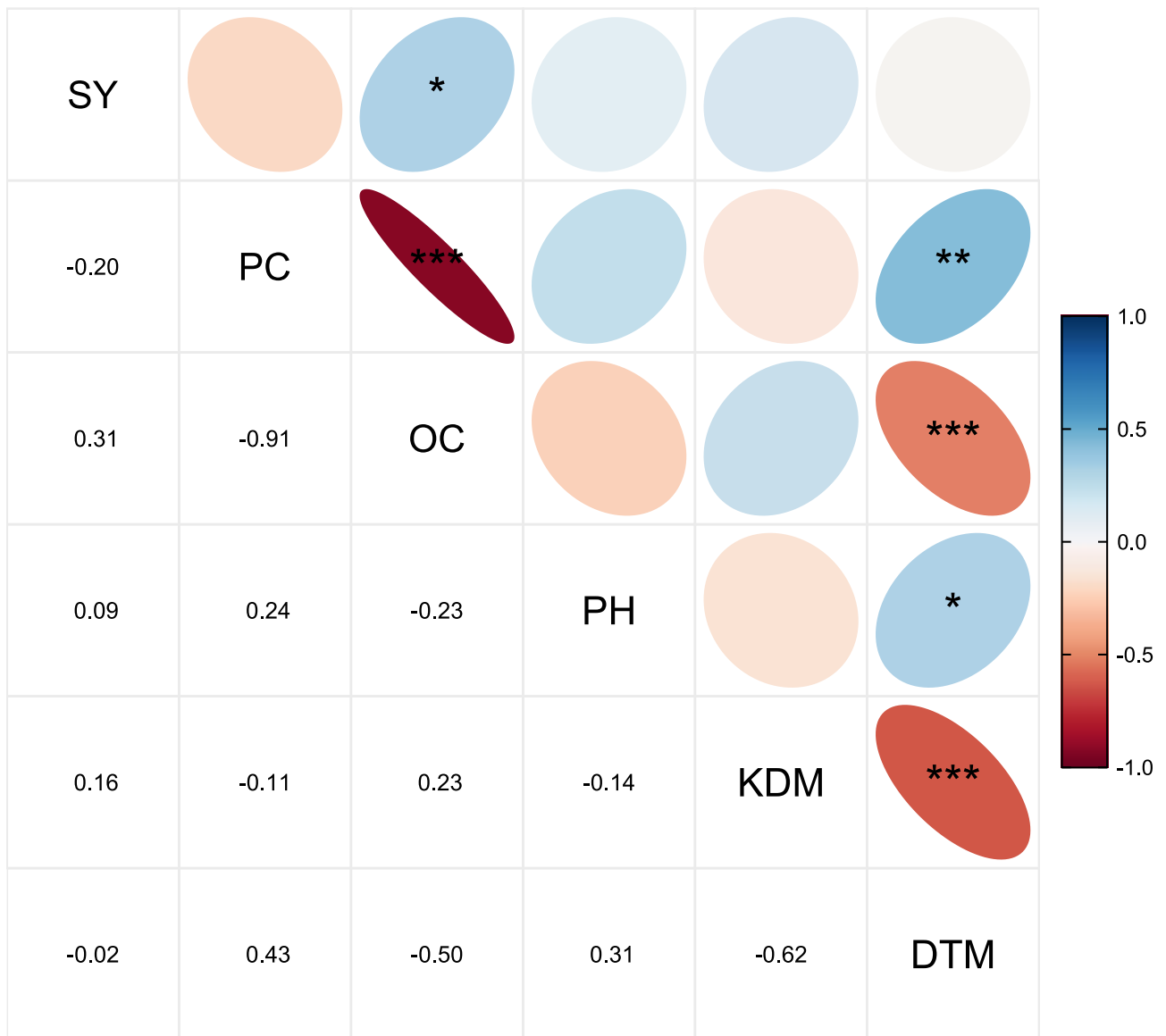


Figure S4. Correlation matrix for six traits across all locations. The traits are seed yield (SY), protein content (PC), oil content (OC), plant height (PH), kernel dry matter content (KDM), and days to maturity (DTM). * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table S1. Shukla's stability measure and mean ranks of 50 genotypes for seed yield (SY) across seven locations. Mean SY represents BLUP values across all locations for each genotype, ranking the highest value as 1 and the lowest value as 50. σ_i^2 represents Shukla's stability variance, ranking the smallest, most stable value as rank 1 and the highest, least stable value as rank 50.

| Genotype | Rank Shukla | σ_i^2 | Rank Mean SY | Mean SY ^s |
|----------|-------------|--------------|--------------|------------------------------|
| G1 | 12 | 6.07 | 33 | 30.07 ^{efghijk} |
| G2 | 33 | 12.05 | 30 | 30.36 ^{efghijkl} |
| G3 | 42 | 15.76 | 42 | 27.52 ^{cde} |
| G4 | 45 | 19.39 | 48 | 22.76 ^{ab} |
| G5 | 9 | 4.76 | 25 | 30.61 ^{efghijklmn} |
| G6 | 21 | 9.19 | 37 | 28.87 ^{defghi} |
| G7 | 13 | 6.08 | 9 | 33.51 ^{lmnopq} |
| G8 | 34 | 12.51 | 2 | 34.91 ^{pq} |
| G9 | 10 | 5.76 | 38 | 28.81 ^{defgh} |
| G10 | 35 | 12.80 | 35 | 29.83 ^{efghij} |
| G11 | 49 | 25.84 | 26 | 30.53 ^{efghijklmn} |
| G12 | 3 | 2.84 | 14 | 32.78 ^{ijklmnop} |
| G13 | 37 | 13.47 | 27 | 30.51 ^{efghijklm} |
| G14 | 4 | 2.87 | 22 | 31.70 ^{ghijklmnop} |
| G15 | 16 | 7.23 | 23 | 31.60 ^{fghijklmnop} |
| G16 | 41 | 14.41 | 39 | 28.61 ^{cdefgh} |
| G17 | 48 | 24.53 | 43 | 25.87 ^{bcd} |
| G18 | 8 | 4.74 | 31 | 30.25 ^{efghijkl} |
| G19 | 39 | 13.65 | 36 | 28.97 ^{defghi} |
| G20 | 22 | 9.28 | 12 | 32.99 ^{ijklmnop} |
| G21 | 18 | 7.71 | 16 | 32.52 ^{ijklmnop} |
| G22 | 15 | 7.16 | 21 | 31.71 ^{ghijklmnop} |
| G23 | 19 | 8.07 | 34 | 29.92 ^{efghij} |
| G24 | 1 | 2.27 | 11 | 33.27 ^{klmnop} |
| G25 | 7 | 4.07 | 5 | 34.19 ^{opq} |
| G26 | 17 | 7.44 | 17 | 32.18 ^{ijklmnop} |
| G27 | 25 | 9.94 | 7 | 33.85 ^{nopq} |
| G28 | 27 | 10.45 | 19 | 31.80 ^{ghijklmnop} |
| G29 | 20 | 9.05 | 6 | 33.96 ^{opq} |
| G30 | 31 | 11.70 | 24 | 31.56 ^{fghijklmno} |
| G31 | 32 | 11.79 | 28 | 30.47 ^{efghijkl} |
| G32 | 47 | 23.47 | 4 | 34.59 ^{opq} |
| G33 | 44 | 18.39 | 32 | 30.11 ^{efghijk} |
| G34 | 24 | 9.50 | 18 | 31.92 ^{hijklmnop} |
| G35 | 28 | 10.83 | 1 | 36.83 ^q |
| G36 | 5 | 3.06 | 29 | 30.43 ^{efghijkl} |
| G37 | 2 | 2.54 | 3 | 34.89 ^{opq} |
| G38 | 30 | 11.67 | 46 | 24.13 ^{ab} |
| G39 | 43 | 18.28 | 49 | 21.57 ^a |
| G40 | 40 | 14.33 | 45 | 25.42 ^{bc} |
| G41 | 14 | 6.42 | 50 | 21.07 ^a |
| G42 | 38 | 13.50 | 15 | 32.68 ^{ijklmnop} |
| G43 | 11 | 5.82 | 8 | 33.83 ^{mnpq} |
| G44 | 50 | 42.48 | 47 | 23.79 ^{ab} |
| G45 | 26 | 10.32 | 13 | 32.97 ^{ijklmnop} |
| G46 | 36 | 13.21 | 41 | 28.28 ^{cdef} |

| | | | | |
|-----|----|-------|----|-----------------------------|
| G47 | 23 | 9.33 | 40 | 28.56 ^{cdefg} |
| G48 | 29 | 11.12 | 10 | 33.49 ^{lmnopq} |
| G49 | 46 | 19.9 | 20 | 31.75 ^{ghijklmnop} |
| G50 | 6 | 3.40 | 44 | 25.64 ^{bcd} |

[§]Mean values assigned with the same letter are not significantly different from each other.

LSD ($\alpha = 0.05$) = 3.34

Table S2. Shukla's stability measure and mean ranks of 50 genotypes for protein content (PC) across six locations. Mean PC represents BLUP values of protein content across all locations for each genotype, ranking the highest value as 1 and the lowest value as 50. σ_i^2 represents Shukla's stability variance ranking the smallest, most stable value as rank 1 and the highest, least stable value as rank 50.

| Genotype | Rank Shukla | σ_i^2 | Rank Mean PC | Mean PC |
|----------|-------------|--------------|--------------|---------|
| G1 | 29 | 0.50 | 37 | 44.28 |
| G2 | 43 | 1.37 | 49 | 41.93 |
| G3 | 17 | 0.33 | 15 | 45.92 |
| G4 | 9 | 0.22 | 8 | 46.55 |
| G5 | 31 | 0.57 | 20 | 45.66 |
| G6 | 10 | 0.24 | 30 | 45.27 |
| G7 | 26 | 0.49 | 35 | 44.36 |
| G8 | 19 | 0.34 | 34 | 44.48 |
| G9 | 18 | 0.34 | 18 | 45.85 |
| G10 | 33 | 0.66 | 9 | 46.36 |
| G11 | 35 | 0.77 | 29 | 45.37 |
| G12 | 3 | 0.10 | 19 | 45.74 |
| G13 | 22 | 0.37 | 4 | 46.64 |
| G14 | 20 | 0.35 | 24 | 45.53 |
| G15 | 42 | 1.33 | 26 | 45.50 |
| G16 | 16 | 0.32 | 5 | 46.60 |
| G17 | 36 | 0.79 | 6 | 46.59 |
| G18 | 15 | 0.32 | 7 | 46.57 |
| G19 | 38 | 0.98 | 17 | 45.89 |
| G20 | 41 | 1.30 | 38 | 44.14 |
| G21 | 13 | 0.29 | 23 | 45.53 |
| G22 | 30 | 0.57 | 32 | 44.87 |
| G23 | 12 | 0.26 | 40 | 43.92 |
| G24 | 21 | 0.36 | 10 | 46.30 |
| G25 | 6 | 0.16 | 27 | 45.48 |
| G26 | 8 | 0.18 | 28 | 45.45 |
| G27 | 11 | 0.26 | 41 | 43.89 |
| G28 | 44 | 1.37 | 31 | 45.16 |
| G29 | 2 | 0.05 | 12 | 46.14 |
| G30 | 4 | 0.10 | 21 | 45.60 |
| G31 | 7 | 0.18 | 22 | 45.54 |
| G32 | 23 | 0.38 | 42 | 43.88 |
| G33 | 24 | 0.39 | 2 | 46.74 |
| G34 | 25 | 0.49 | 45 | 43.14 |
| G35 | 5 | 0.13 | 33 | 44.56 |
| G36 | 32 | 0.64 | 14 | 45.95 |

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|-----|----|------|----|-------|
| G37 | 34 | 0.74 | 3 | 46.72 |
| G38 | 49 | 2.41 | 1 | 48.51 |
| G39 | 28 | 0.50 | 25 | 45.50 |
| G40 | 14 | 0.31 | 11 | 46.26 |
| G41 | 37 | 0.95 | 13 | 46.06 |
| G42 | 39 | 1.08 | 16 | 45.90 |
| G43 | 1 | 0.03 | 39 | 43.98 |
| G44 | 45 | 1.40 | 46 | 42.80 |
| G45 | 48 | 2.40 | 47 | 42.22 |
| G46 | 46 | 1.62 | 43 | 43.57 |
| G47 | 40 | 1.14 | 50 | 41.81 |
| G48 | 27 | 0.50 | 36 | 44.35 |
| G49 | 47 | 1.84 | 48 | 42.04 |
| G50 | 50 | 6.01 | 44 | 43.35 |

Table S3. List of genotypes evaluated in this study.

| Genotype | Genotype Name | Pedigree | Maturity Group |
|----------|---------------------------|---------------------------------|----------------|
| G1 | Tofina | Tofina | 000 |
| G2 | Merlin | Merlin | 000 |
| G3 | Lenka | Lenka | 00 |
| G4 | Simocine SZS | Simocine SZS | 000 |
| G5 | SJE17-2708-n-n-n-4867-008 | Lenka × EWE 20 | - |
| G6 | SJE15-418-02-03-n-102-n | EWE 0013 × EWE 0004 | - |
| G7 | SJE17-2716-n-n-n-5820-001 | ES Mentor × (Protina × Aveline) | - |
| G8 | SJE17-2718-n-n-n-6093-034 | ES Mentor × EWE 20 | - |
| G9 | SJE17-2708-n-n-n-4740-001 | Lenka × EWE 20 | - |
| G10 | SJE17-2708-n-n-n-4743-004 | Lenka × EWE 20 | - |
| G11 | SJE17-2708-n-n-n-4745-006 | Lenka × EWE 20 | - |
| G12 | SJE17-2708-n-n-n-4749-010 | Lenka × EWE 20 | - |
| G13 | SJE17-2708-n-n-n-4750-011 | Lenka × EWE 20 | - |
| G14 | SJE17-2708-n-n-n-4754-015 | Lenka × EWE 20 | - |
| G15 | SJE17-2708-n-n-n-4862-003 | Lenka × EWE 20 | - |
| G16 | SJE17-2708-n-n-n-4871-012 | Lenka × EWE 20 | - |
| G17 | SJE16-2020-n-n-n-1088-001 | Lenka × (Silvia × EWE 0016) | - |
| G18 | SJE16-2004-n-n-n-0121-001 | Lenka × Sigalia | - |
| G19 | SJE16-2002-n-n-n-0002-002 | Lenka × Tofina | - |
| G20 | SJE16-2002-n-n-n-0003-003 | Lenka × Tofina | - |
| G21 | SJE16-2002-n-n-n-0004-004 | Lenka × Tofina | - |
| G22 | SJE16-2002-n-n-n-0009-009 | Lenka × Tofina | - |
| G23 | SJE16-2002-n-n-n-0017-017 | Lenka × Tofina | - |
| G24 | SJE17-2723-n-n-n-6486-006 | Amadea × EWE 20 | - |
| G25 | SJE17-2718-n-n-n-6060-001 | ES Mentor × EWE 20 | - |
| G26 | SJE17-2718-n-n-n-6061-002 | ES Mentor × EWE 20 | - |
| G27 | SJE17-2718-n-n-n-6069-010 | ES Mentor × EWE 20 | - |
| G28 | SJE17-2718-n-n-n-6083-024 | ES Mentor × EWE 20 | - |
| G29 | SJE17-2718-n-n-n-6084-025 | ES Mentor × EWE 20 | - |

| | | | |
|-----|-----------------------------|------------------------------------|--------|
| G30 | SJE17-2718-n-n-n-6091-032 | ES Mentor × EWE 20 | - |
| G31 | SJE17-2718-n-n-n-6096-037 | ES Mentor × EWE 20 | - |
| G32 | SJE17-2718-n-n-n-6098-039 | ES Mentor × EWE 20 | - |
| G33 | SJE17-2716-n-n-n-5821-002 | ES Mentor × (Protina × Aveline) | - |
| G34 | SJE16-2069-n-n-n-2475-003 | ES Mentor × Lenka | - |
| G35 | SJE16-2069-n-n-n-2476-004 | ES Mentor × Lenka | - |
| G36 | SJE17-2713-n-n-n-5340-001 | ES Commander × EWE 20 | - |
| G37 | SJE17-2713-n-n-n-5464-005 | ES Commander × EWE 20 | - |
| G38 | SJE13-047-n-n-p-001-110-n | (Primus × Sultana) × Protibus | - |
| G39 | SJE13-047-n-n-p-001-111-n-n | (Primus × Sultana) × Protibus | - |
| G40 | SJE13-047-n-n-p-001-121-n | (Primus × Sultana) × Protibus | - |
| G41 | SJE13-047-n-n-p-001-210-n | (Primus × Sultana) × Protibus | - |
| G42 | SJE17-2718-n-n-n-6100-041 | ES Mentor × EWE 20 | - |
| G43 | SJE17-2723-n-n-n-6483-003 | Amadea × EWE 20 | - |
| G44 | Smaragd | Smaragd | 0 |
| G45 | Nessie PZO | Nessie PZO | 000 |
| G46 | Magnolia PZO | Magnolia PZO | 000 |
| G47 | Adessa | Adessa | 0000 |
| G48 | Achillea | Achillea | 000 |
| G49 | Wapiti | Wapiti | 000 |
| G50 | Solena | Solena | 000/00 |